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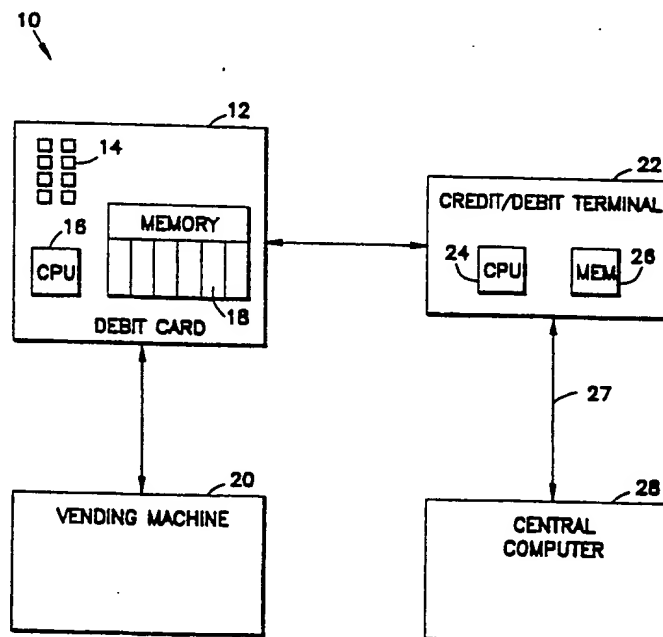
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(54) Title: MICROCOMPUTER DEBIT CARD



## (57) Abstract

A debit card (12), including a microcomputer (16). The microcomputer (16) is programmed such that a plurality of memory zones are available with differing levels of accessibility to each of the zones. Funds may be transferred from an external source into the zones, or funds may be transferred from zone to zone.

MICROCOMPUTER DEBIT CARDField of the Invention

The present invention relates to debit cards, and  
5 more particularly, to a debit card having a first  
protected account having restricted access and a second  
unprotected account having less restricted access.

Background of the Invention

10 The present invention relates to a debit card  
apparatus and the method for programming the same. More  
particularly, the present invention relates to a debit  
card apparatus and a method for programming the same to  
be used in applications where funds must be transferred  
15 routinely.

The debit cards are substantially flat, thin plastic  
articles, such as credit cards, bank cards, drivers  
licenses, membership cards, etc., currently in  
widespread use. Recently, manufacturers of these cards  
20 have provided such cards with their own integrated  
circuit or their own microcomputer. The debit cards may  
contain the same external qualities of the credit card,  
including the magnetic stripe, photo ID, printing, and  
embossing.

25 A debit card contains one or more integrated  
circuits (IC) chips. The chips provide microprocessing,  
memory, and an input/output capability. The memory in  
most types of debit cards has a nonvolatile property  
found in some of the best hand-held calculators. This  
30 nonvolatile memory remembers stored data without a  
constant power supply. The size of the memory in  
microcomputers continues to increase as technology  
evolves.

The combination of credit-card size, nonvolatile  
35 memory, and computer chip provides a unique set of  
features that open new doors for solving old problems.  
These new qualities are dependable security, reliable  
off-line data storage, and microcomputer power.

Uses for cards comprising microcomputers include

restricted access and a second account having less restricted access.

In one embodiment, access to the restricted account requires use of a personal identifier number (PIN)

5 whereas access to the second account does not require use of a PIN.

In one embodiment, the second account is accessible by a vending machine having an appropriate access key or access code.

10 In one embodiment, the present invention relates to a debit card apparatus, including a microcomputer. Memory in the microcomputer is programmed to include a plurality of zones. A first zone has a more restricted access than a second zone. There is a funds transfer  
15 means for transferring a funds amount from an external source into an account field of at least one of the zones. The funds transfer means may also transfer a funds amount from an account field of one zone to the account field of another zone.

20 A particularly advantageous feature of the present invention is that use of the debit card enables rapid transaction and debiting of an account. More specifically, in the food service and vending industries, the present invention allows a user to  
25 quickly choose a menu item, have an account debited, and receive the card and the food item back.

The present invention provides a debit card with a first protected account in a first memory zone that is accessible only by a personal identification number and  
30 a second unprotected account in a second memory zone that is accessible without a personal identification number. There are other memory zones which are separate and distinct and may share access to either the first or second memory zone.

35 Other memory zones may be included in the microcomputer. A third zone may have the lowest access restrictions. A fourth zone may be merely a record zone

personal identification number. Also, vendors may offer bonuses and awards to the card holder based on the number of transactions or level of deposits. These bonuses are an added incentive for the customer to use  
5 the debit card.

These and various other advantages and features of novelty which characterize the invention are pointed out with particularity in the claims annexed hereto and forming a part hereof. However, for better  
10 understanding of the invention, its advantages, and objects obtained by its use, reference should be made to the drawings which form a further part hereof and to the accompanying descriptive matter in which there is illustrated and described a preferred embodiment of the  
15 invention.

#### Brief Description of the Drawings

In the drawings, in which like reference numerals and letters indicate corresponding parts throughout the  
20 several views;

Figure 1 is a schematic drawing of a debit card system of the present invention;

Figure 2 is a diagrammatic view of the memory zone of a debit card of the present invention;

25 Figure 3 is a diagrammatic view of the access keys to the memory zones of the present invention;

Figure 4 is a flow diagram of the debit card of the present invention being utilized in a transaction terminal; and

30 Figure 5 is a flow diagram of the debit card of the present invention being used in a vending machine.

#### Detailed Description of the Preferred Embodiment

Generally, a debit card will be issued by a vendor  
35 of a product or service to a user. The user will have certain information programmed into the debit card via a terminal. There will be, in the narrowest sense, two

embedded in the card 12. The integrated circuits include a central processor unit (CPU) 16, reusable nonvolatile memory 189, and an input/output capability. The size of the memory can vary with a range of 256 to 5 2000 being preferred. Of course as more memory is made available, additional applications and functions can be added to the debit card 12. The debit card 12 will preferably use a standard ISO format for its interface function with other intelligent sites. In addition to 10 its integrated circuits, the debit card 12 may include external features typically present on credit cards, cash cards, identification cards, etc. These features might include a magnetic stripe having information magnetically stored thereon, a photo identifier, printed 15 information, embossed information, etc. The debit card 12 shown is preferably pocket sized; e.g., roughly the size of a standard credit card. Its carrier material might be the same type of plastic card stock used for credit cards. While the embodiment of the debit card 12 20 shown does not include a display, keypad, and battery, other embodiments of the debit card 12 might include a display, keypad, and/or battery and still be in keeping with the principles of the present invention.

In the system shown, the debit card 12 is shown as 25 being used with a vending machine 20 and a credit/debit terminal 22. Use of the debit card 12 with the vending machine 20 allows the user to purchase a menu selection from the vending machine 20. The credit/debit terminal 22 shown allows the user to transfer funds in and out of 30 the debit card 12, as well as from memory zone to memory zone within the debit card 12. The credit/debit terminal shown has a CPU 24, associated memory 256 and interfaces with a remote central computer 28. The interconnection between the credit/debit terminal 22 35 might be accomplished by any number of ways; e.g., conventional telephone lines 27 as shown, dedicated lines, wireless transmission, etc. The central computer

level. For example, there may be only certain fields within a memory zone which are accessible to a user. Zones may be shared by applications, e.g., there may be subzones set up within a given memory zone with each  
5 subzone being assigned to a different vendor. It will be appreciated that the debit card may take on numerous variations in its design.

Diagrammatically illustrated in Figure 2 is a schematic flow diagram of schematic organization of an  
10 embodiment of microcomputer memory 30 of the present invention. There is a common data zone 32. There is a food service application protected memory zone 34. There is a vending application unprotected memory zone 36. There is a shared food service application  
15 protected memory zone 38. There is a shared vending application unprotected memory zone 46. There is an access application memory zone 42, and a transaction record zone 44. Funds may be transferred from the first protected account field of the food service application  
20 zone 34 to the second unprotected account field of the vending application zone 36. The transfers may flow in either direction between these two zones. The protected memory zone 34 requires some sort of user identification such as a personal identification number (PIN) to access  
25 the first protected account field of the protected memory zone 34. On the other hand, a general terminal which interfaces with a card may access second unprotected account field of the unprotected memory zone 36.

30 In the preferred embodiment, the debit card 12 will include a plurality of memory zones having different fields of information. The memory zones of one embodiment will now be discussed.

#### 35 Zone 0

The common data zone 32 is one of many zones envisioned in the present invention. The purpose of the

field of the service application protected zone.  
Possible fields for this transfer include payroll  
deduction plans and cash/change machines, wherein cash  
or change may be inserted into a terminal and recorded  
5 thereafter in the protected account of the service  
application protected zone.

Fields may be set up which allow the user to borrow  
against the service application protected memory zone  
such that IOU's are recorded. There also may be a  
10 maximum amount specified for the unprotected account  
field.

A drop-dead data field may be implemented into the  
service application protected memory zone. The purpose  
of the drop-dead data field is to disable the card after  
15 a predetermined length of time. After a designated  
period of nonuse elapses, that amount of funds in the  
protected zone of the card becomes unavailable through  
the user of the card. This protects both the user and  
the issuer of the card. If the user were to lose the  
20 card and the period of time elapsed, the card would  
become useless to anyone attempting to use the debit  
card. Furthermore, this feature protects the issuer of  
the card from reimbursing a user who claimed the card  
was stolen, but later finds that the user uses the card  
25 after reimbursement from the issuer of the card. This  
feature allows the issuer of the card to wait until the  
period of nonuse occurs before reimbursing the user.  
After this period, the card becomes useless.

Other fields that might be included within the  
30 protected zone are maximum advances per month, month of  
last advance, month advance this month, amount in  
protected area, total amount of non-vending purchases,  
total number of non-vending purchases, and date of last  
vending purchase. All these values may be used to  
35 monitor the user's use of the debit card.

Promotional programs may be set up such that if the  
user frequents a specific terminal, transfers a certain

the debit card to be used in more than one set of terminals or applications. The original issuer of the debit card would provide a second party with a format code key which accesses the shared protected zone 38 and which in turn provides the access key to the protected memory zone. This would allow the second vendor of services or products to use a debit card in the same manner as the original issuer of the card, but may use it for entirely different services. Multiple applications could be used in each card. In addition to the preferred food service industry, other services, such as check cashing, health care, ticket purchasing, equipment checkout, and building access are among the few that could be implemented into the present invention. Additional shared protection application zones 46 might be present.

The original issuer of the card could, thus, license out the use of other shared protected application zones. This "licensing" would also minimize the number of cards that a user would have to carry.

#### Shared Vending Application Unprotected Zone

A fourth memory zone, the shared vending application unprotected zone 40, similar to the shared protected application zone, may be formatted for a different use. The issuer of the card provides a third vendor of services or products with a format key for accessing the shared unprotected zone which in turn provides access to the unprotected zone such that the funds in the unprotected account may be accessed for various applications. The third vendor may then provide an application, such as vending applications, such that the user may use the debit card in the third vendor's vending machines. The third party would have access to the amount in the unprotected zone, but would not have access to the amount in the protected zone. This would allow the original issuer of the card to license access



memory.

Figure 4 is a flow diagram describing the events occurring at a transaction terminal. A card user inserts a card in a transaction terminal. The card user  
5 must enter a personal identification number. The card user has a choice whether to transfer funds to the first protected account from an external source or transfer funds from the first protected account to the second unprotected account. If the user chooses to transfer  
10 funds from an external source, the external source must be designated. Possible external sources of funds may be cash, payroll deductions, bank savings, checking accounts, credit cards, etc. The amount to be transferred must be less than or equal to the amount  
15 available in the external source. If it satisfies this criteria, the transfer is made into the first protected account of the first protected zone and the balance is displayed. If there are insufficient funds, the transaction terminal will not allow the transfer and an  
20 alert signal will be displayed on the terminal.

If the funds are to be transferred from the first protected account to the unprotected account of the second zone, the amount to be transferred must be less than or equal to the amount available in the first zone.  
25 The amount is then transferred to the second zone. If the amount to be transferred is greater than the second zone's maximum limit, the transaction terminal will not allow the transfer to take place and the alert display will occur on the terminal. If the transaction does not  
30 exceed the maximum limit, funds will be transferred and remaining balances of the first and second zones will be displayed on the terminal. The user then exits the transaction terminal.

Figure 5 is a flow diagram describing the events  
35 occurring in a vending application. The user inserts a debit card into the vending machine and selects a menu selection. The vending machine accesses the unprotected

## WHAT IS CLAIMED IS:

1. A method for making a debit card, including a microcomputer, the method comprising:

5 (a) programming the microcomputer to comprise a plurality of distinct memory zones, first account field of a first memory zone having more restricted access than a second account field of a second memory zone; and

10 (b) programming the microcomputer to transfer funds from an external source into at least one of the zones and to transfer funds from the first zone to the second zone.

15 2. A method in accordance with claim 1, including the steps of programming the microcomputer so that the account field of the first memory zone is accessible with a personal identification number.

20 3. A method in accordance with claim 1, further including the steps of programming the microcomputer to comprise a third memory zone having a less restrictive access than the second memory zone.

25 4. A method in accordance with claim 1, further including the steps of programming the microcomputer to comprise a plurality of separate and distinct memory subzones of the first memory zone.

30 5. A method in accordance with claim 1, further including the steps of programming the microcomputer to comprise a plurality of separate and distinct memory subzones of the second memory zone.

35 6. A method in accordance with claim 1, further including the steps of programming the microcomputer to comprise a fourth zone for the purpose of recording

13. A debit card in accordance with claim 9,  
wherein there is a plurality of separate and distinct  
unprotected second memory zones.

5 14. A debit card in accordance with claim 9,  
wherein there is a fourth memory zone recording data.

15. A debit card in accordance with claim 9,  
wherein the user may program an upper limit on funds  
10 available from the second account field.

16. A debit card in accordance with claim 9,  
wherein a time value may be programmed into the  
unprotected memory zone, such that after the time value  
15 has elapsed, remaining funds in the first account field  
become inaccessible through the use of the card.

17. A vending method comprising the steps of:

- (a) inserting a debit card with a  
20 microcomputer memory into a vending machine, the debit  
card comprising:
  - (i) a plurality of distinct memory zones;
  - (ii) a first memory zone having an account  
field with more restrictive accessibility than an  
25 account field of a second memory zone;
  - (b) selecting an article to be vended;
  - (c) comparing the account field balance in the  
second memory zone of the debit card with the price of  
the article to be vended; and
  - 30 (d) debiting the account field balance if the  
price of the article is less than the account field  
balance.

18. A debit card, comprising:

- 35 (a) a debit card having a microcomputer and  
memory comprising:
  - (i) a first account field located in

next usage, and if this elapsed time exceeds a predetermined amount, disabling any further transactions relative to the first account field.

- 5 26. A debit card in accordance with claim 18,  
including a key code look up table in memory identifying  
memory zones associated with a specific access code.
27. A debit card in accordance with claim 26,  
10 wherein selected memory zones will include an access  
field containing the access code of another memory zone.
28. A debit card in accordance with claim 18,  
wherein the debit card includes printed and embossed  
15 indicia thereon.
29. A debit card in accordance with claim 18,  
wherein the debit card includes a display.
- 20 30. A debit card in accordance with claim 18,  
wherein the debit card includes a magnetic stripe.

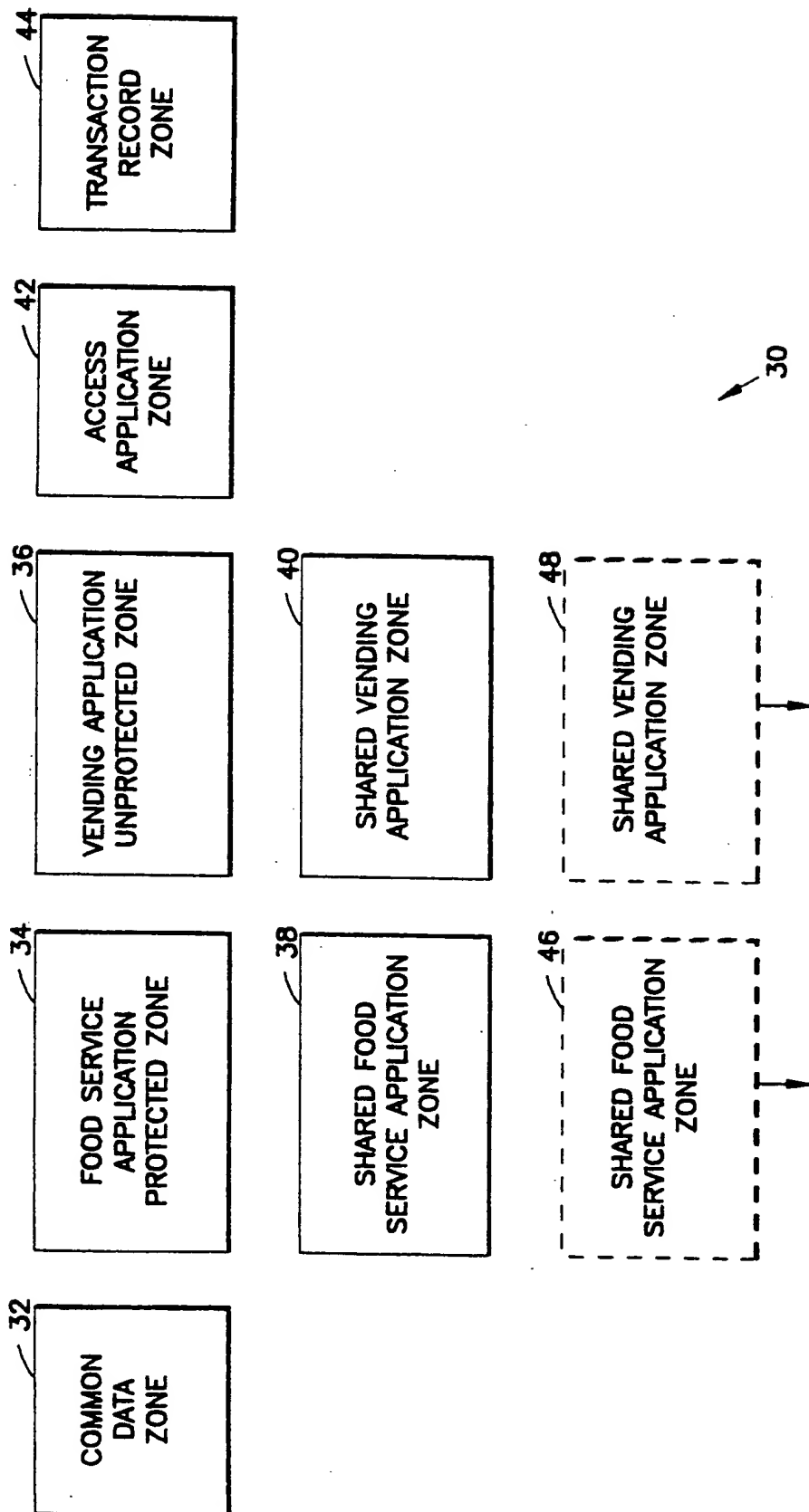


FIG. 2

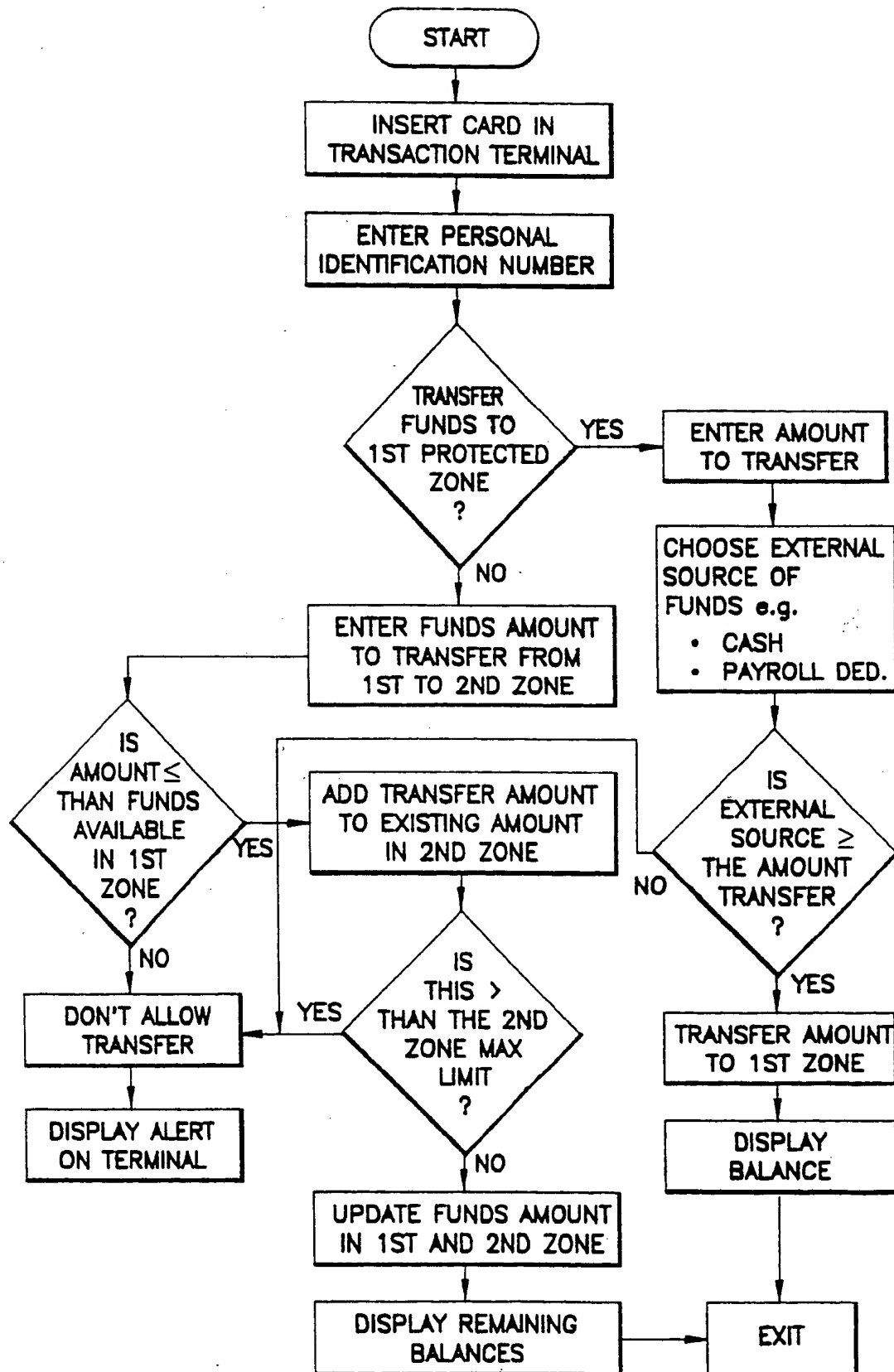


FIG. 4

SUBSTITUTE SHEET

# INTERNATIONAL SEARCH REPORT

International Application No. PCT/US90/02592

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (if several classification symbols apply, indicate all) <sup>6</sup> According to International Patent Classification (IPC) or to both National Classification and IPC IPC (5) : G06F 7/06, G06K 19/073 U.S. C1 : 235/380,381,487,492																							
<b>II. FIELDS SEARCHED</b> <div style="text-align: center; border-top: 1px solid black; border-bottom: 1px solid black; margin: 5px 0;">Minimum Documentation Searched <sup>7</sup></div> <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 25%; border: 1px solid black; text-align: left;">Classification System</th> <th style="border: 1px solid black; text-align: left;">Classification Symbols</th> </tr> <tr> <td style="border: 1px solid black; text-align: center; vertical-align: middle;">U.S.</td> <td style="border: 1px solid black; text-align: center; vertical-align: middle;">235/380,381,487,492</td> </tr> </table> <div style="text-align: center; border-top: 1px solid black; border-bottom: 1px solid black; margin: 5px 0;">Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched <sup>8</sup></div>			Classification System	Classification Symbols	U.S.	235/380,381,487,492																	
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<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT <sup>9</sup></b> <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 10%; border: 1px solid black; text-align: left;">Category <sup>*</sup></th> <th style="border: 1px solid black; text-align: left;">Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup></th> <th style="width: 10%; border: 1px solid black; text-align: left;">Relevant to Claim No. <sup>13</sup></th> </tr> <tr> <td style="border: 1px solid black; text-align: center; vertical-align: top;">Y</td> <td style="border: 1px solid black; vertical-align: top;">US,A 4,367,402 (GIRAUD ET AL) 4 January 1983 See entire document.</td> <td style="border: 1px solid black; text-align: center; vertical-align: top;">1-30</td> </tr> <tr> <td style="border: 1px solid black; text-align: center; vertical-align: top;">Y</td> <td style="border: 1px solid black; vertical-align: top;">US,A 4,256,955 (GIRAUD ET AL) 17 March 1981 See entire document.</td> <td style="border: 1px solid black; text-align: center; vertical-align: top;">1-30</td> </tr> <tr> <td style="border: 1px solid black; text-align: center; vertical-align: top;">Y</td> <td style="border: 1px solid black; vertical-align: top;">US,A 4,211,919 (UGON) 08 July 1980 See entire document.</td> <td style="border: 1px solid black; text-align: center; vertical-align: top;">1-30</td> </tr> <tr> <td style="border: 1px solid black; text-align: center; vertical-align: top;">Y</td> <td style="border: 1px solid black; vertical-align: top;">US,A 4,204,113 (GIRAUD ET AL) 20 May 1980 See entire document.</td> <td style="border: 1px solid black; text-align: center; vertical-align: top;">1-30</td> </tr> <tr> <td style="border: 1px solid black; text-align: center; vertical-align: top;">Y,P</td> <td style="border: 1px solid black; vertical-align: top;">US,A 4,882,474 (ANDERL ET AL) 21 November 1989 See entire document.</td> <td style="border: 1px solid black; text-align: center; vertical-align: top;">1-30</td> </tr> <tr> <td style="border: 1px solid black; text-align: center; vertical-align: top;">Y</td> <td style="border: 1px solid black; vertical-align: top;">US,A 3,697,729 (EDWARDS ET AL) 10 October 1972 See entire document.</td> <td style="border: 1px solid black; text-align: center; vertical-align: top;">8,25</td> </tr> </table> <div style="margin-top: 10px;"> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p><sup>*</sup> Special categories of cited documents: <sup>10</sup></p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&amp;" document member of the same patent family</p> </div> </div> </div>			Category <sup>*</sup>	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>	Y	US,A 4,367,402 (GIRAUD ET AL) 4 January 1983 See entire document.	1-30	Y	US,A 4,256,955 (GIRAUD ET AL) 17 March 1981 See entire document.	1-30	Y	US,A 4,211,919 (UGON) 08 July 1980 See entire document.	1-30	Y	US,A 4,204,113 (GIRAUD ET AL) 20 May 1980 See entire document.	1-30	Y,P	US,A 4,882,474 (ANDERL ET AL) 21 November 1989 See entire document.	1-30	Y	US,A 3,697,729 (EDWARDS ET AL) 10 October 1972 See entire document.	8,25
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<b>IV. CERTIFICATION</b> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; border: 1px solid black; vertical-align: top;">           Date of the Actual Completion of the International Search   <div style="text-align: center; font-size: 1.2em;">18 July 1990</div> </td> <td style="width: 50%; border: 1px solid black; vertical-align: top;">           Date of Mailing of this International Search Report   <div style="text-align: center; font-size: 1.5em;">15 AUG 1990</div> </td> </tr> <tr> <td style="border: 1px solid black; vertical-align: top;">           International Searching Authority   <div style="text-align: center;">ISA/US</div> </td> <td style="border: 1px solid black; vertical-align: top;">           Signature of Authorized Officer  <div style="text-align: center;">              HAROLD PITTS           </div> </td> </tr> </table>			Date of the Actual Completion of the International Search  <div style="text-align: center; font-size: 1.2em;">18 July 1990</div>	Date of Mailing of this International Search Report  <div style="text-align: center; font-size: 1.5em;">15 AUG 1990</div>	International Searching Authority  <div style="text-align: center;">ISA/US</div>	Signature of Authorized Officer <div style="text-align: center;">              HAROLD PITTS           </div>																	
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